

Effect of Vanadium Addition to Aluminum Grain Refined by Ti or Ti + B on Its Microstructure, Mechanical Behavior, Fatigue Strength and Life

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Abstract : As aluminum solidifies in columnar structure with large grain size which reduces its surface quality and mechanical strength; therefore it is normally grain refined either by titanium or titanium + boron (Ti or Ti + B). In this paper, the effect of addition of either Ti or Ti + B to commercially pure aluminum on its grain size, Vickers hardness, mechanical strength and fatigue strength and life is presented and discussed. Similarly, the effect of vanadium addition to Al grain refined by Ti or Ti+ B is presented and discussed. Two binary master alloys Al-Ti and Al-Vi were laboratory prepared from which five different micro-alloys in addition to the commercially pure aluminum namely Al-Ti, Al-Ti-B, Al-V, Al-Ti-V and Al-Ti-B-V were prepared for the investigation. Finally, the effect of their addition on the fatigue cracks initiation and propagation, using scanning electron microscope, SEM, is also presented and discussed. Photomicrographs and photoscans are included in the paper.

Keywords : aluminum, fatigue, grain refinement, titanium, titanium+boron, vanadium

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